BRAIN TRAUMATIC INJURY in Tennessee 2000-2004

August 2006

Traumatic brain injury (TBI) is defined as an acquired injury to the brain caused by an external physical force that may result in total or partial disability or impairment. In the United States, an estimated 1.4 million people sustain a traumatic brain injury each year. An estimated 80,000 to 90,000 people with TBI experience a permanent disability from their injury. At least 5.3 million Americans, approximately 2 percent of the U.S. population, currently have a long-term or life-long need for help to perform activities of daily living as a result of a TBI.[1]

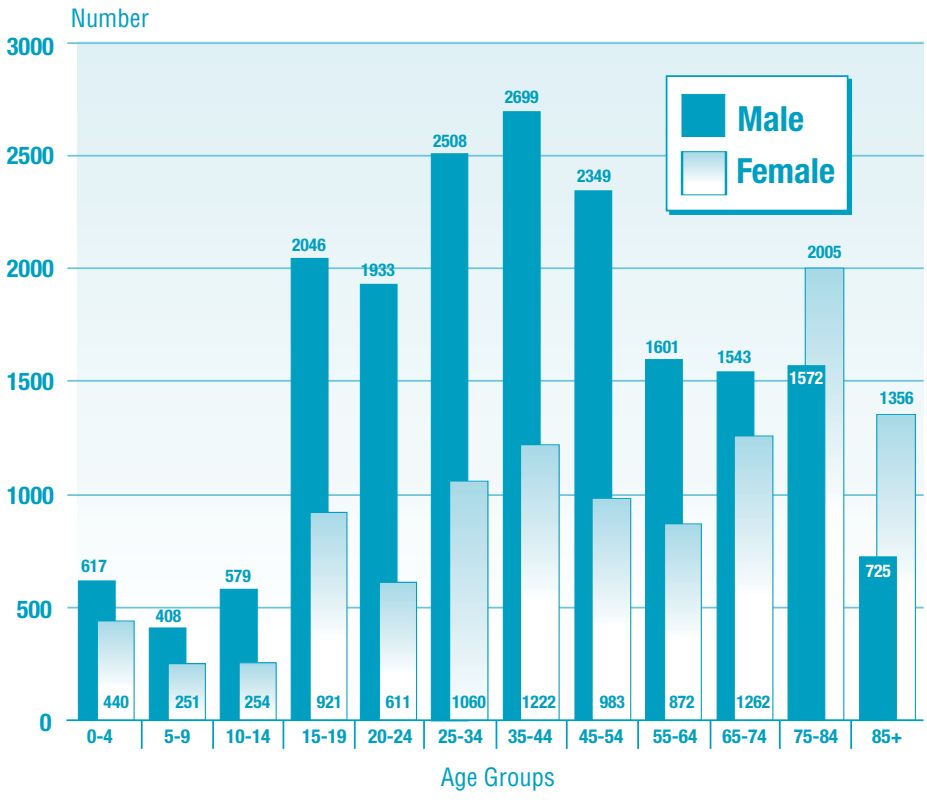
Tennessee TBI-related Morbidity

During the years 2000-2004, there were a total of 29,824 hospitalizations with a traumatic brain injury (TBI) related diagnosis for a 5 year hospitalization rate of 103 per 100,000 population.[2] Of these hospitalizations, 1,535 died from their injuries. The average length of stay for an episode of TBI-related care was 9.2 days, with a median hospital charge of $12,260 per episode of care. Tennessee hospitals charged over 851 million dollars to payers during the 5 year period. Commercial or HMO insurance payers were billed 41 percent of the time. TennCare was billed 22 percent and Medicare 20 percent of the time. One percent of the cases were classified as "free care" and 5 percent as "self-pay." Eleven percent of the cases were classified as other or unknown.

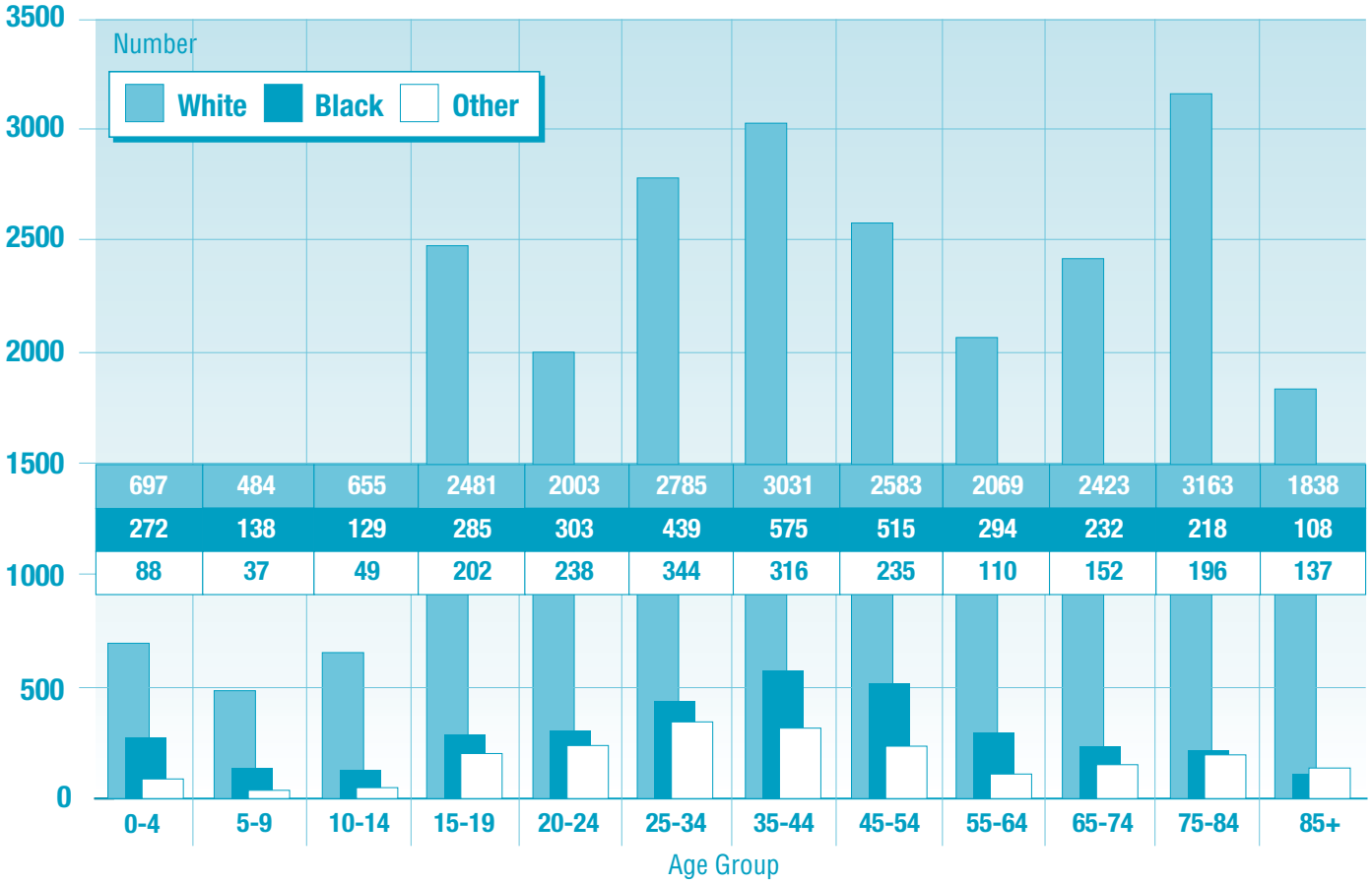
For 2000-2004, an average of 16 persons were hospitalized daily due to the severity of their injuries. Causes for TBI-related hospitalizations could be determined for 91.9 percent of the cases; valid E-Codes were not available for the others. A majority of hospitalizations (75.0 percent) were classified as unintentional. The leading causes of TBI hospitalizations were motor vehicle traffic accidents (40.5 percent) and falls (20.8 percent). Firearms were involved in 15.2 percent of the hospitalizations resulting in a fatality.

Males were more likely to be hospitalized than females except for those 75 or older, when the number of hospitalizations for females greatly increased. For males ages 15-19, the TBI hospitalizations were twice those of females in that age group. The number of hospitalizations for males 20-24 was three times the number for females during the 5 year period of 2000-2004. After age 44, the number of hospitalizations decreased for both males and females until ages 65 and older when the number for females began to increase.

Tennessee Traumatic Brain Injury Hospitalizations by Age Group and Sex 2000 - 2004



Tennessee Traumatic Brain Injury Hospitalizations by Age Group and Race 2000 - 2004



Across all age groups, whites were more likely to be hospitalized for TBI than blacks or other races. For whites, the highest number of hospitalizations occurred in ages 75-84. The number of black TBI hospitalizations was highest for ages 35-44 while the highest number for other races was for ages 25-34.

Tennessee Traumatic Brain Injury Hospitalizations by Age Group and Rate Per 100,000 Population 2000-2004

Age Group	TBIs	Rate per 100,000
Under 1	463	122.1
1-4	594	38.7
5-9	659	33.3
10-14	833	41.4
15-19	2,968	147.9
20-24	2,544	129.4
25-29	1,830	91.4
30-34	1,738	84.1
35-39	1,851	84.3
40-44	2,071	91.5
45-49	1,771	82.9
50-54	1,562	80.3
55-59	1,225	76.5
60-64	1,248	97.8
65-69	1,280	121.2
70-74	1,527	171.6
75-79	1,820	251.7
80-84	1,757	356.6
85+	2,083	486.6
Total	29,824	103.0

Elderly adults 65 and above accounted for 28.4 percent of the hospitalizations, while 15-24 year olds accounted for 18.5 percent.

Although more TBIs occurred to adolescents and young adults in Tennessee, the highest hospitalization rates for TBI are in the elderly – especially those older than 70 years of age.

Adolescents and young adults ages 15-24 were most likely to be hospitalized for motor vehicle traffic accidents (65.0 percent).

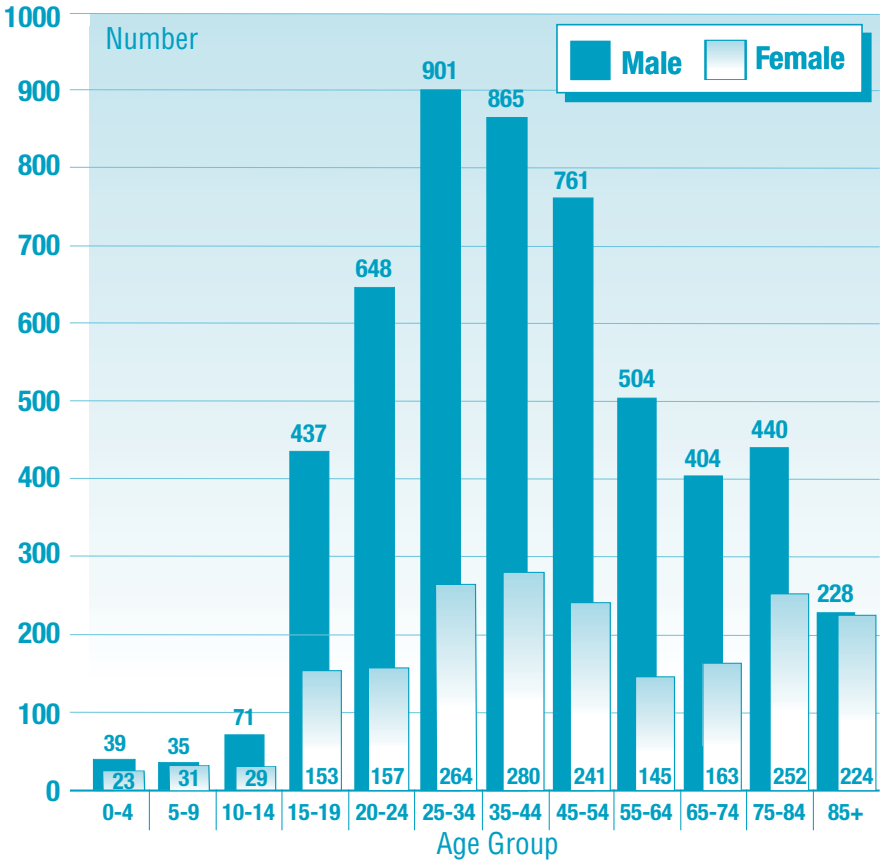
Tennessee TBI-related Mortality

During 2000-2004, there were a total of 7,295 TBI-related deaths, 2.6 percent of all deaths for the time period.[3] The crude 5 year rate for TBI-related deaths is 25.2 per 100,000 population. A common measure of premature mortality is the years of potential life lost or YPLL.[4] From TBI alone, Tennesseans lost 187,104 years of potential life during the period 2000-2004. Over the 5 year period 5,760 TBI-related deaths (22 every week) occurred before the patient could be transported to a hospital.

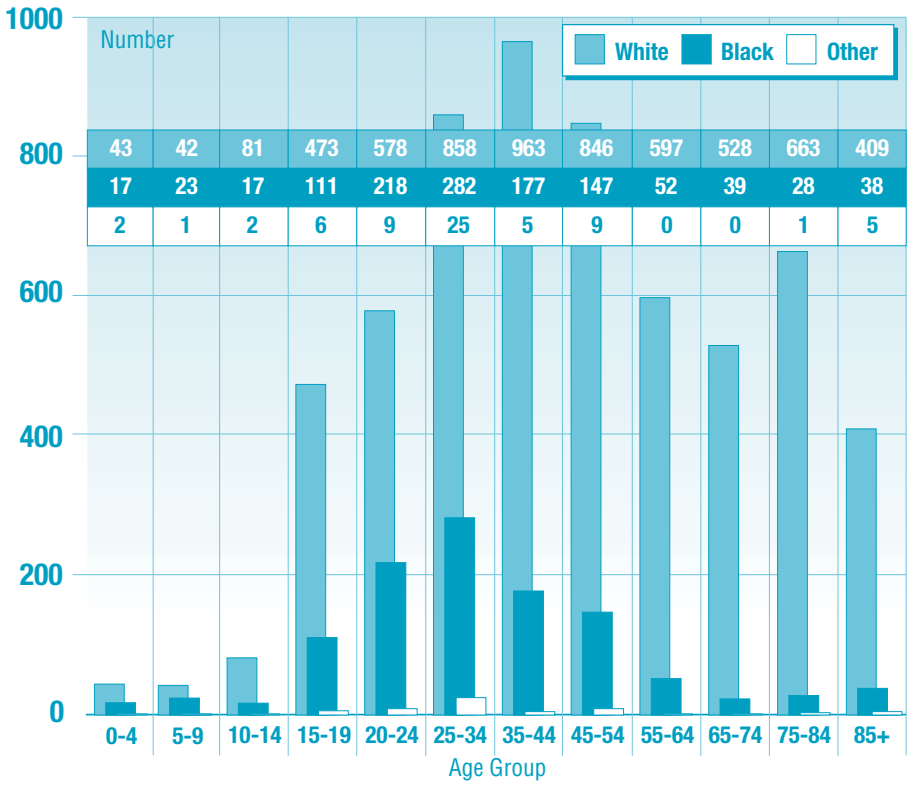
Across all age groups, there were more male deaths from a TBI-related injury than female deaths.

Fifty-three percent of TBI-related deaths were unintentional. Of the deaths that were intentional (including legal intervention deaths and undetermined causes), 84 percent involved the use of a firearm. Fifty-one percent of the TBI-related deaths for 15-24 year olds were caused by motor vehicle accidents.

Tennessee Traumatic Brain Injury Deaths by Age Group and Sex 2000 - 2004



Tennessee Traumatic Brain Injury Deaths by Age Group and Race 2000 - 2004



For 2000-2004, there were more white deaths than minority deaths across all age groups. For whites, the largest number of TBI-related deaths occurred in the 35-44 age group. For blacks and other races, the largest number of TBI-related deaths occurred in the 25-34 age group.

As with TBI-related hospitalizations, deaths related to falls occurred disproportionately among the elderly with 72.1 percent of the TBI fall-related deaths occurring to those over the age of 65.

Overall Tennessee TBI

The hospital discharge and mortality data were combined to examine the spectrum of traumatic brain injury in Tennessee. The highest fatality rates for TBIs resulted from firearms, followed by motor vehicle traffic (MVT) unspecified/other, and MVT occupant injuries. Eighty-five percent of TBI-related total firearm injuries (including intentional and unintentional) resulted in a fatality.

Total traumatic brain injuries to the elderly 65 and older were most likely to be caused by falls (41.5 percent). Falls are also the leading cause of TBI for children under the age of 4.

The number of motor vehicle crash-related TBIs peaked in the 15–24 year age group; 30 percent of both injuries and fatalities occurred in this age group. The case-fatality rate – the proportion of TBI injuries that resulted in a fatality - was highest among adults aged 20-39 (24 percent case-fatality rate).

Twenty-seven percent of TBI-related deaths were suicide and 17 percent were homicide related.

Bicycling accounted for 14.1 percent of nonfatal TBI for children ages 5–14, and nonfatal pedestrian injuries accounted for another 9.6 percent of TBI in this age group. Ten percent of striking injuries were sports related.

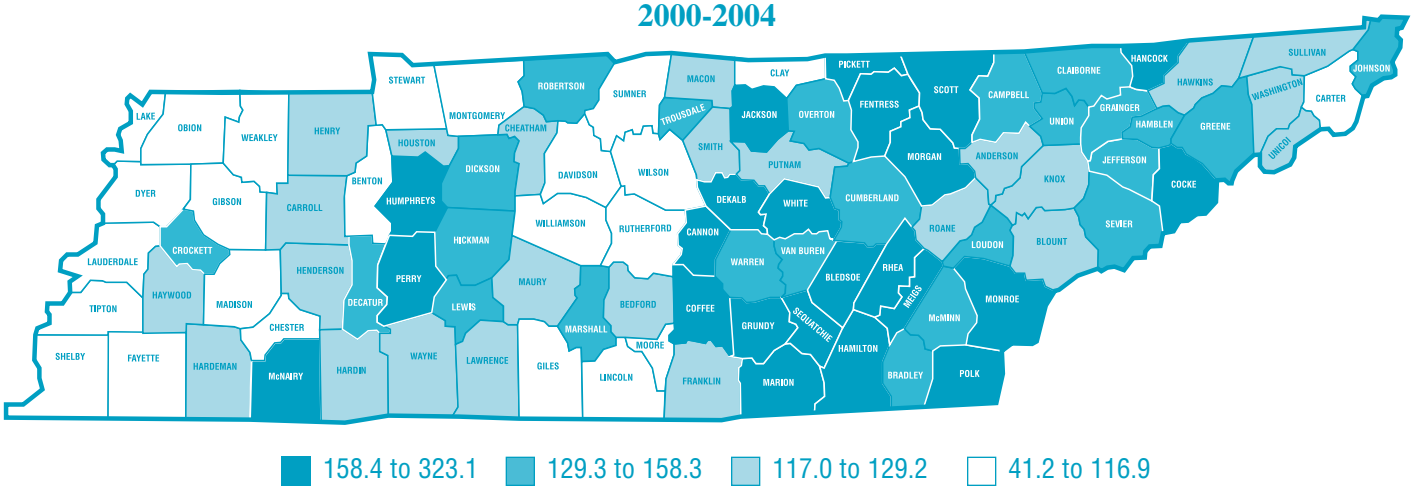
The maps display the geographic distribution of the 5 year rates in TBI across Tennessee. Maps for TBI rates, TBI death rates and TBI hospitalization rates are presented. All rates are crude rates.

Tennessee Traumatic Brain Injury Hospitalizations and Deaths 2000 - 2004

Leading Mechanism	Nonfatal (Hospitalization minus deaths)	Fatal (Deaths)	Case-Fatality Rate (%)*
Fall	6,200	839	11.9
Firearm	520	3,031	85.4
MVT Motorcyclist	780	128	14.1
MVT Occupant	9,188	1,717	15.7
MVT Pedal cyclist	145	12	7.6
MVT Pedestrian	724	117	13.9
MVT Unspecified / Other	1,251	355	22.1
Pedal cyclist, other	283	2	0.7
Struck by, against	1,389	66	4.5
Transport, other	1,146	108	8.6

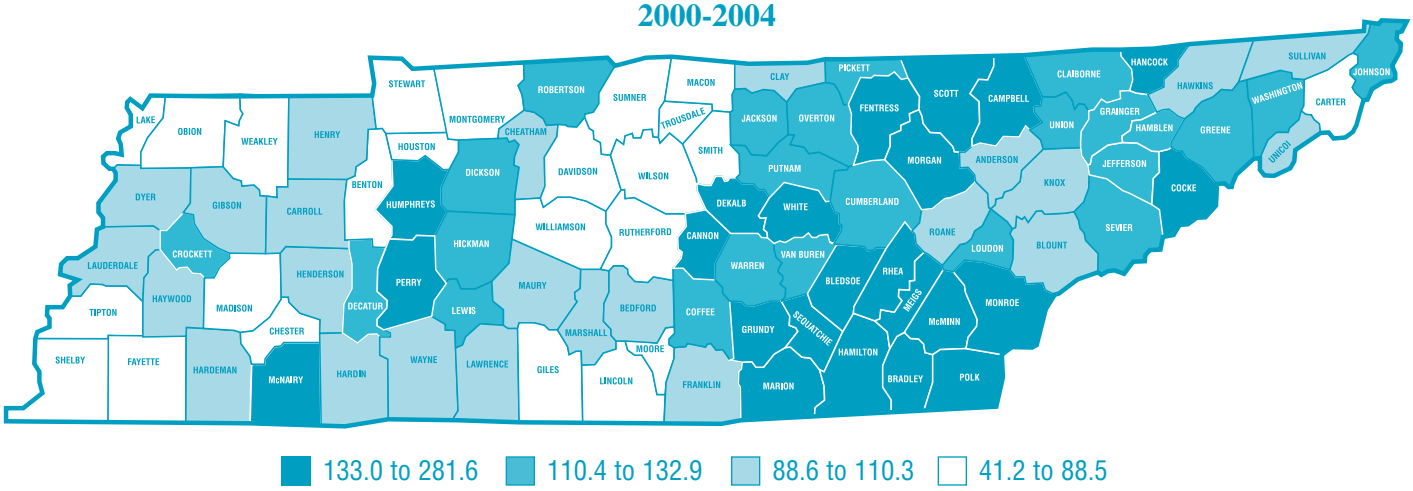
**The proportion of TBI injuries that resulted in a fatality.*

Tennessee Traumatic Brain Injury Rates by County 2000-2004



The state traumatic brain injury rate is 122.9 per 100,000 population.

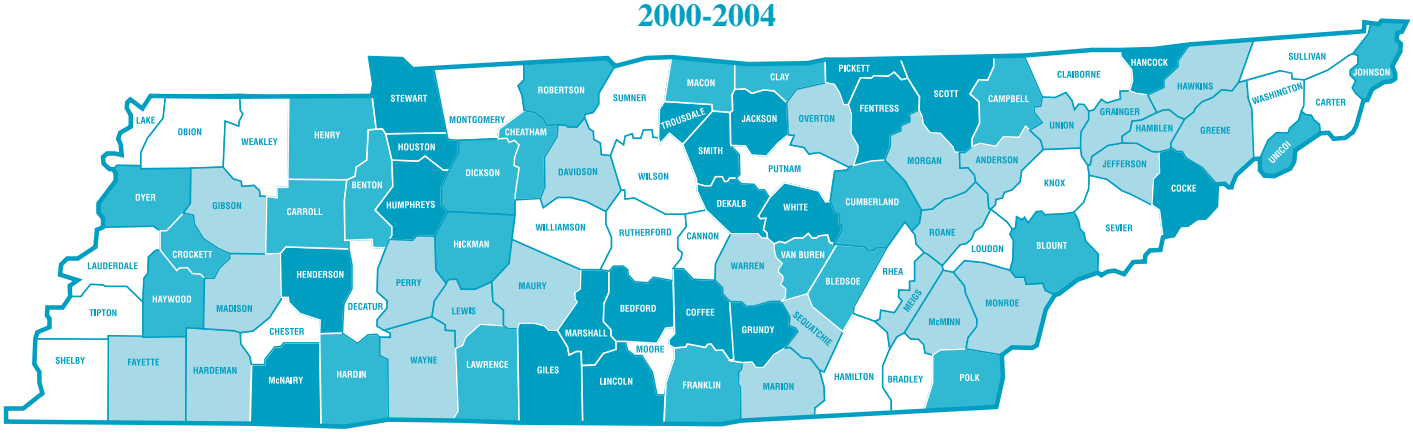
Tennessee Traumatic Brain Injury Hospitalization Rates by County 2000-2004



133.0 to 281.6 110.4 to 132.9 88.6 to 110.3 41.2 to 88.5

The state traumatic brain injury hospitalization rate is 103 per 100,000 population.

Tennessee Traumatic Brain Injury Death Rates by County 2000-2004



37.0 to 67.9 28.8 to 36.9 24.0 to 28.7 6.9 to 23.9

The state traumatic brain injury death rate is 25.2 per 100,000 population.

Sources

[1] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, http://www.cdc.gov/ncipc/tbi/TBI.htm

[2] TBI case definition codes were taken from the report: Marr A, Coronado V, editors. *Central Nervous System Injury Surveillance Data Submission Standards-2002*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2004. A hospitalization was considered to be TBI-related if any of the following ICD-9-CM codes were in the primary through fifth diagnosis fields: 800.0-801.9, 803.0-804.9, 850.0-854.1, 950.1-950.3, 959.01 or 995.55.

[3] A death was considered to be TBI-related if any of the following ICD-10 codes was in any of the first five contributing cause of death fields: S01.0-S01.9, S02.0, S02.1, S02.3, S02.7-S02.9, S04.0, S06.0-S06.9, S07.0, S07.1, S07.8, S07.9, S09.7-S09.9, T01.0, T02.0, T04.0, T06.0, T90.1, T90.2, T90.4, T90.5, T09.8 or T90.9

[4] YPLL were calculated using the National Center for Health Statistic's guidelines. For more information see: http://www.cdc.gov/nchs/datawh/nchsdefs/yearsofpotentiallifelost.htm

NOTE: The population estimates for Tennessee used to calculate the rates in this report were based on figures prepared from the 2000 census in August 2003 by the Division of Health Statistics. These revised population figures may result in rates that differ from those previously published.

The Tennessee Hospital Discharge Data System supplies the hospitalization data for this report.

Death certificates filed with the Office of Vital Records supplied the death data for this report.

Please visit the **Division of Health Statistics** and **Health Information Tennessee (HIT)** pages on the Tennessee Department of Health website by selecting Statistics and Data at: **tennessee.gov/health**

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